## ALBERTA OIL SANDS INDUSTRY QUARTERLY

UPDATE

SUMMER 2009 (Reporting on the period: March 24 to June 18, 2009)

Government of Alberta

# All about the oil sands

Background of an important global resource



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Alberta has the second-largest deposit of oil in the world—only Saudi Arabia can claim a larger stockpile of crude. But 173 billion of Alberta's 179 billion barrels of oil have the special quality of being bitumen, a resource that has been developed for decades but is only now coming into the forefront of the global energy industry, as conventional supplies-so-called "easy" oilcontinue to be depleted. The figure of 173 billion barrels represents what is considered economically recoverable with today's technology, but with new technologies, this reserve estimate could be increased to as much as 315 billion barrels.

There are three major bitumen (or oil sands) deposits in Alberta. The largest is the Athabasca deposit, located in the province's northeast in the Regional Municipality of Wood Buffalo. The main population centre of the Athabasca deposit is the City of Fort McMurray. The second-largest oil sands deposit is referred to as Cold Lake, just south of Athabasca, with the main population centre the City of Cold Lake. The smallest oil sands deposit is known as Peace River, which is located in northwest central Alberta. A fourth deposit called Wabasca links to the Athabasca and is generally lumped in with that area.

The existence of bitumen in Alberta has been known for a long time. The first mention of it in Canadian history was in 1719, when a Cree named Wapasu brought a sample of the "gum" to a Hudson's Bay trading post. First Nations in what is now the Wood Buffalo area had traditionally used the bitumen, which seeps from outcrops along the Athabasca River, to waterproof their canoes.

Today bitumen is produced as an energy source by two means—mining and in situ. The majority of oil sands production is done by surface mining, but this will likely change in the future,

as 80 per cent of Alberta's bitumen deposits are too deep underground to economically employ this technology.

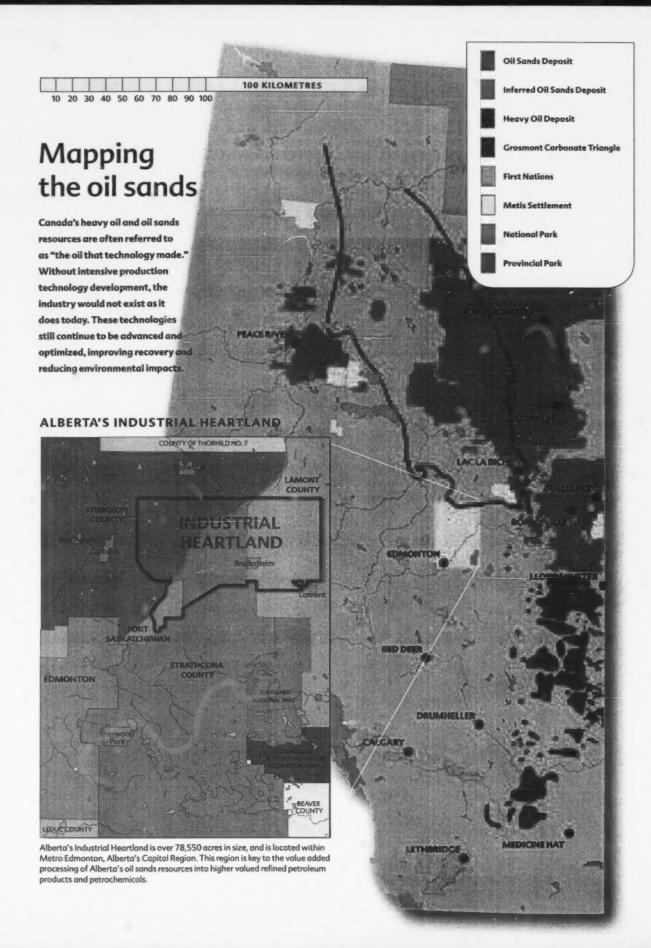
Right now there are essentially two commercial methods of in situ (Latin for "in place," essentially meaning wells are used rather than trucks and shovels). In cyclic steam stimulation (CSS), high-pressure steam is injected into directional wells drilled from pads for a period of time, then the steam is left to soak in the reservoir for a period, melting the bitumen, and then the same wells are switched into production mode, bringing the bitumen to the surface.

In steam assisted gravity drainage (SAGD), parallel horizontal well pairs are drilled from well pads at the surface. One is drilled near the top of the target reservoir, while the other is drilled near its bottom. Steam is injected into the top well, a steam chamber forms, and via gravity, the melted bitumen flows into the lower well and is pumped to the surface using artificial lift.

Both SAGD and CSS are used in the Cold Lake and Peace River deposits, while SAGD is the in situ technology of choice in the Athabasca deposit. The choice is based on a number of things including geology. The technologies combined currently produce just over one million barrels per day.

Research is underway on a number of other production technologies designed to optimize production and minimize water and energy use, including vapour extraction (VAPEX), and a form of in situ combustion known as toe to heel air injection (THAI).

Bitumen that has not been processed, or "upgraded," can be used directly as asphalt. It must be diluted to travel by pipeline. Adding value, some producers upgrade their product into synthetic crude oil (SCO), which is a refinery feedstock. At these refineries it can be transformed into transportation fuels and other products. •



# All about the oil sands

Background of an important global resource

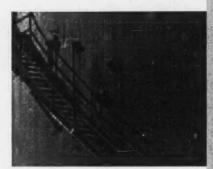


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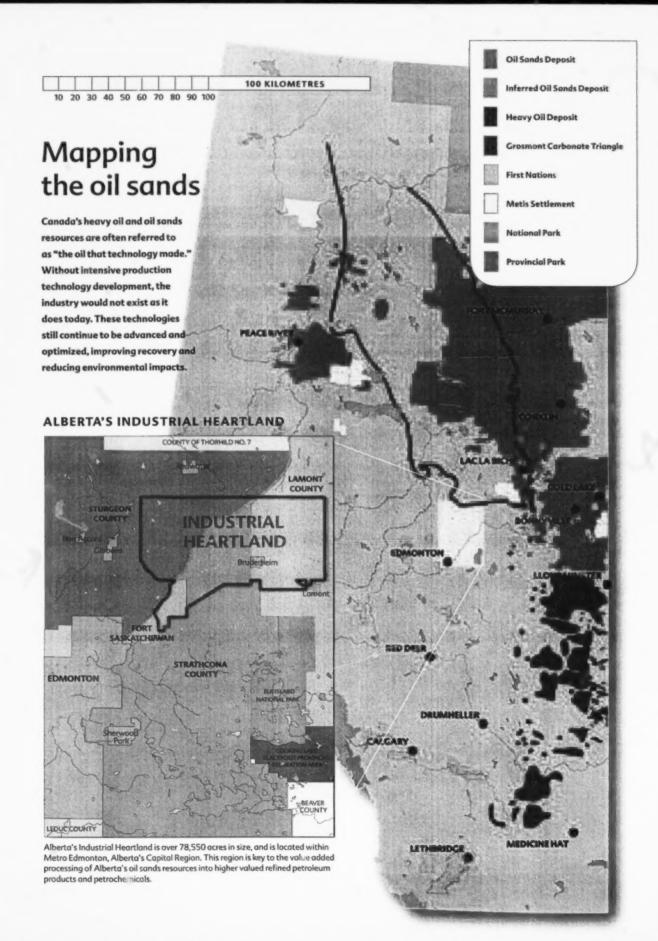
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## Government update



#### BUDGET 2009

The Alberta government has reinforced its commitment to responsible development in Budget 2009 with significant funding to provide stronger environmental protection and support sustainable growth.

Highlights of the budget include:

More than \$22 million has been allocated across government this year in operating support for the Water for Life strategy. In addition, \$100 million in capital support is included in the 2009-12 Capital Plan for Water for Life projects. Water for Life initiatives in 2009-10 include finalizing and implementing the provincial wetlands policy, reviewing the water allocation and management system, and expanding water monitoring, evaluation and public reporting and cumulative effects management.

Up to \$30 million will be allocated in 2009-10 to support reclamation efforts of older, depleted and abandoned oil and gas wellsites. In addition, \$13 million—fully supported by an industry levy to the Energy Resources Conservation Board (ERCB)—will be allocated to the Orphan Well Abandonment Program.

The Alberta government has also allocated \$102 million for environmental management in 2009-10, which includes approvals, compliance, and enforcement activities to reduce and manage cumulative effects of activity on the environment. An additional \$55 million for biofuel initiatives will be committed in 2009-10 to further support the development of renewable energy and offer additional economic opportunities for rural Alberta and the agriculture and forestry industries. Clean energy production is a key objective of the Provincial Energy Strategy, and this funding will help produce the capacity needed to meet Alberta's Renewable Fuels Standard of five per cent ethanol in gasoline and two per cent biodiesel by 2010. This standard has the potential to reduce CO2 emissions by about one million tonnes annually-equivalent to taking about 200,000 vehicles off the roads each year.

In addition to other capital commitments in the oil sands regions, Budget 2009 provides \$210 million this year and \$171 million the following year to

provide new or upgraded infrastructure in the Fort McMurray area of Alberta, including a new bridge over the Athabasca River, and new interchanges at Thickwood Boulevard and Confederation Way. This follows recommendations developed in Responsible Actions: A Plan for Alberta's Oil Sands, which calls for timely investment in infrastructure in oil sands regions.

#### RESEARCH AND TECHNOLOGY

The Government of Alberta, through Genome Alberta, is supporting a project that looks at new ways to use microbes in energy production, with the potential of reducing the use of water and natural gas in oil sands extraction and improving the management of tailings ponds.

Researchers will examine Alberta's energy reserves for microbes that exist naturally in oil sands and coal seams. These living organisms cause the natural breakdown of hydrocarbons and the project will look into how these processes could be used in energy production. For example, this science could speed up the settling rate of tailings ponds so the water can be recycled sooner.

Genome Canada and Alberta's research community are also contributing to the \$11.6 million project, which was announced at Bio 2009, the world's largest biotechnology gathering, which took place in Atlanta, Georgia.

#### SUPPLY AND DEMAND FORECAST

The ERCB has released its annual report Alberta's Reserves 2008 and Supply/Demand Outlook 2009-2018. Based on the ERCB's own geological and technical analysis, this report presents information on the state of reserves and the supply and demand for Alberta's diverse energy resources: bitumen, crude oil, natural gas, natural gas liquids, coal, and sulphur. It includes estimates of reserves at Dec. 31, 2008, and a 10-year supply/demand forecast for each resource. A supply/demand forecast of electricity in Alberta is also provided. The report also includes historical data for energy resources production. Alberta's Reserves 2008 and Supply/Demand Outlook 2009-2018 is available on the ERCB website at www.ercb.ca or from ERCB Information Services, Main Floor, 640-5 Avenue SW, Calgary, Alberta, T2P3G4.



## What's new in the oil sands

Key updates from summer 2009

IIII Shareholders of both Suncor and Petro-Canada have approved the merger of the two companies, which would create Canada's largest oil company and an oil sands giant. Interestingly, this merger would also give the "new Suncor" Petro-Canada's 12 per cent stake in Syncrude, Suncor's long-time competitor. The transaction is expected to close in the third quarter.

IIII Imperial Oil has approved the first phase of Kearl. an \$8 billion oil sands mining project 70 kilometres northeast of Fort McMurray, Alberta, estimated to ultimately produce more than 300,000 barrels per day of bitumen starting in late 2012. The first phase will produce an average 110,000 barrels per day.

All regulatory requirements are in place and construction will now begin in earnest, said spokesman Gordon Wong. "It's a very exciting time for the company. Work has been underway in terms of predevelopment, and now we'll be looking forward toward construction."

Imperial has spent about \$800 million on the project so far, and 1,000 employees and contractors have been working on it. According to its regulatory application, peak construction will see about 3,000 employees and contractors at the site for the first phase.

Development plans do not include any on-site upgrading facilities. Bitumen will be blended with diluent and shipped to market through third-party pipeline systems.

Royal Dutch Shell plc's expansion of its Athabasca Oil Sands Project, which will add 100,000 barrels per day of bitumen production through construction of another mine and upgrader, is still on track for completion in 2010-11, says a company spokesman.

Paul Hagel said the last of the materials have been delivered and there is now a big push to advance the mechanical and electrical instrumentation work.

It's no longer cyclic steam stimulation (CSS), and it's 20,000 barrels per day smaller than the original project, but a new design for Shell's Carmon Creek expansion at Peace River, Alberta, is on the table.

Shell filed a regulatory application in December 2006 to expand the existing site by 100,000 barrels per day from current capacity of 12,500 barrels per day, but withdrew the application last November, citing planned changes.

continued next page

### What's new in the oil sands continued

EMI Shell is working towards submitting a new Carmon Creek application by year's end, which would employ steam drive rather than CSS, says spokeswoman Adrienne Lamb. The company expects the regulatory review to take more than 18 months from the date of submitting the new application.

"Pending the timing and outcome of the regulatory review process, we could be in a position to make an investment decision in 2011," she said. "Our decision to proceed would take a number of factors into consideration, including the outcome of the regulatory process, project costs, markets conditions, consultation with stakeholders, etc."

A notional, or theoretical, timeframe in Shell's new public information document suggests that the project wouldn't be on stream before the end of 2014.

As a matter of company policy, Royal Dutch Shell doesn't disclose cost estimates.

In preparation for the new application, the company has issued a public disclosure document (a broad overview of the project) and the proposed terms of reference for a new environmental impact assessment.

**IIII** Syncrude Canada will deploy deterrents yearround on its settling basins and has improved its waterfowl protection system in advance of this year's bird migration, the company said as it announced that duck mortality at its ponds a year ago was three times as high as originally declared. The number is up to 1,606 from 500.

Syncrude said it has purchased a radar-based migration monitoring system, which will help with ongoing research of migration patterns. The pilot project will analyze trends and help adjust the deterrent system to ensure the best protection measures are in place, said Syncrude. The system is in operation at some of North America's largest airports.

Alberta Environment Minister Rob Renner told a news conference that he is satisfied with Syncrude's promise of increased measures and that everyone is doing their utmost to ensure it does not happen again.

He said the province is increasing its monitoring of all oil sands operators during spring migrations. This will include unannounced spot checks as well as scheduled visits.

III After nearly four months of back and forth between Total and UTS, the French giant has terminated its offer to acquire the oil sands junior, whose board rejected the offer as inadequate. Total has also sold a 10 per cent interest in the proposed Northern Lights oil sands project to SinoCanada Petroleum Corporation (Sinopec), a subsidiary of China Petroleum & Chemical Corporation.

Northern Lights will now be owned 50-50 by Total and Sinopec.

**EBB** Suncor Energy says it accepts its Alberta provincial court-imposed penalties for two environmental offences at its oil sands facilities and has taken measures to ensure they don't happen again.

The company pleaded guilty on April 2 to the violations and was sentenced to paying a total of \$850,000, including \$175,000 for failing to properly supervise its camp operator, Compass Group, for noncompliance offences.

"While the fine was substantial, we do accept it. We did enter a guilty plea and we acknowledge that we fell short of the regulations and of our own expectations of ourselves," said Suncor spokesman Brad Bellows.

Suncor Energy has recognized the achievement of a \$1 billion goods and services spending milestone with Aboriginal business partners in the Wood Buffalo region.

The company has been collecting data since 1992 on its spending with Aboriginal companies in the Regional Municipality of Wood Buffalo near its oil sands operations in northeastern Alberta. With Aboriginal business-related spending of \$220 million in 2008, the company surpassed a \$1 billion goods and services spending milestone with these companies.

IIII On April 21, 2009, Finning achieved a significant milestone with the delivery of its 200th Caterpillar 797—one of the largest mining trucks in the world—to the oil sands industry. The 797 was first introduced in 1999.

It took Finning eight years to reach the 100th truck delivery mark, and just two more to double it.

IIII Husky is reporting the costs for its proposed Sunrise project have fallen by about \$2 billion. The project was unveiled during Alberta's oil sands construction boom when some projects saw 100 per cent cost overruns.

But in recent months, ail sands operators have delayed tens of billions of dollars in spending, which—combined with the global economic slowdown—has driven down costs such as steel and labour.

North Peace Energy says it has allocated capital to advance front-end engineering work and the regulatory approval process for a 3,000 barrel per day pilot expansion, which it considers more viable than the previously planned 10,000 barrel per day first-phase commercial project in the current economic conditions. But even the 3,000 barrel per day option would still require higher commodity prices, the company said.

North Peace now expects the project to start up in 2012, after it submits an application later this year.

Devon Energy began injecting steam into the final pair of wells at its Jackfish steam assisted gravity drainage (SAGD) project in March, and all 24 well pairs are now operational.

The company says production reached 28,000 barrels per day in March, and it expects Jackfish to reach its design capacity of 35,000 barrels per day later this year. As well, construction at Jackfish 2 continues.

"During the second quarter, we will focus on completing the construction camp and transporting plant modules to the site," said David Hager, executive vice-president, exploration and production.

Jackfish 2 is sized to produce another 35,000 barrels per day. Devon expects to invest about US\$1 billion in Jackfish 2 by the time it's operational in 2011.

IIII Although Flint Energy Services is reducing its head count and streamlining operations due to the slowdown in oil sands activity and conventional drilling, the company will be well positioned to capitalize when commodity prices recover, says its

President and chief executive officer Bill Lingard told the company's annual meeting that Flint continues to take appropriate measures to tough out current industry conditions, including laying off about 1,000 employees and reducing the salaries of both retained employees and management.

Lingard said that while the company will be negatively affected by reduced capital spending in the oil sands this year, as the price of crude strengthens he expects activity will slowly begin to rebound.

"What we see going forward is that some clients will have a long-term horizon of what the oil price looks like and will commit to either re-starting projects that were delayed or start up new project...and we think with oil getting close to \$60, we're going to get there fairly quickly."

The resumption in the ramp-up of Connacher Oil and Gas' Great Divide Pod One SAGD project is proceeding as planned after production was curtailed in December in response to low oil prices, says the company's top official.

"We have weathered the storm," Dick Gusella, president and chief executive officer, said in a conference call to discuss first-quarter results. Gusella says the plant is expected to achieve stable and sustainable production at or near capacity of 20,000 barrels per day in the second half of 2009.

Connacher has also re-instated construction of its Algar SAGD project, a second 10,000 barrel per day installation it put on hold in December 2008 due to economic conditions.

**BBI** Excelsior Energy says it will file a regulatory application in the second quarter to test a new bitumen fireflood technique once economic conditions improve.

The company said it is fully funded to submit its Hangingstone combustion overhead gravity drainage (COGD) pilot project application, reprocess seismic data for the North Sea and cover general and administration costs through 2010. (Excelsior is targeting 2011 for its pilot start-up.)

Southern Pacific Resource has submitted an application to the Alberta Energy Resources Conservation Board and Alberta Environment for the development of a 12,000 barrel per day SAGD project in northeastern Alberta.

Tulsa, Oklahoma-based Williams Companies has announced plans to build a US\$283 million pipeline to transport natural gas liquids and olefins from its extraction plant in Fort McMurray, Allberta, to its processing facility in Redwater, Alberta.

Williams currently processes off-gas from Suncor Energy's oil sands facility, extracts the natural gas liquids and olefins and transports them via a Suncor pipeline. Current production is 14,000 barrels per day. The new 12-inch proposed pipeline will provide additional capacity for Suncor liquids, as well as natural gas liquids from other oil sands producers' off-gas.

Construction is expected to begin in 2010, with an anticipated in-service date of April 2012. Initial capacity is to be 43,000 barrels per day, with future capability of up to 125,000 barrels per day.





## **Project listings**

## Updated status of oil sands projects in Alberta As of June 18, 2009 with files from Strategy West.

#### TECHNOLOGY LEGEND

CSS Cyclic steam stimular

COGD Combustion overhead garvity drainage ET-DSP Electro-thermal dynamic stripping process

SACD Steam assisted gravity drainage

THAI The to heel air injection

COMPANY	CURRENT PROJECT	CAPACITY (IMVd)	25tr-	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOL
ATHABASCA	REGION - IN	S-1 T U		· production		255.6
ALBERTA OILSANDS	No.	The Party Carlo	1000			
Clearwater	Commercial Project	10,000	TBO	Announced	Company says it is on track to file an application in 2009.	SAGD
ATHABASCA OIL SAN	DS .					
Dover	Pilot	1,000-2,000	TBO	Applied	Regulatory application submitted Oct. 22, 2008.	SAGD
	Pilot	2,200	TBD	Applied	Regulatory application submitted Jun. 2, 2008.	SAGD
MacKay River	Commerical Phase 1	35,000	2014	Announced	The compuny expects to file a regulatory application towards the end of 2009.	SAGD
CANADIAN NATURAL	RESOURCES	DELINE.	T. T.			
Birch Mountain	Phase 1	60,000	TBD	Announced		TBA.
Gregoire Lake	Phase 1	60,000	TBD	Announced		TBA
Grouse	Phase 1	60,000	TBO	Announced		TBA
Kirby	Phose 1	45,000	TBO	Applied	Canadian Natural will decide in late 2009 or early 2010 when to proceed.	SAGD
Leismer	Phase 1	30,000	TBO	Announced		TBA
CHEVRON CANADA	-	A PURE		A		
Ells River	_1	100,000	2015	Announced	Chevron is looking at "a range of thermal and enhanced recovery technologies."	TBA
CONNACHER OIL AND	GAS	S COLOR	11000	11448811	ON SHIP HAVE BEEN THE	
1.00多数的	Pod 1	10,000	2007	Operating	Ramp-up reinstated.	SAGD
	Pod 2 (Algor)	10,000	2010	Under	Board of directors has authorized the re-activation of Algar.	SAGD
Great Divide				construction	and the second of the additional and the second sec	
1.2012年3月2	Expansion	24,000	2012	Disclosed	Public disclosure issued March 2009.	SAGD
CONOCOPHILLIPS CAI	NADA	11000		glera ili		1
Surmont	Phase 1	27,000	2008	Operating		SAGD
	Phose 2	83,000	2013	Approved	Engineering underway.	SAGD
DEVON CANADA		PALSO IS		10000		100
	Phose 1	35,000	2008	Operating	Steam injection has been initiated into final well pair. All 24 well pairs now operational. Full capacity expected to be reached in Q2 or Q3.	SAGD
Jockfish	Phase 2	35.000	2011			-
ENCANA	Phase 2	35,000	2011	Approved	Devon reports construction continues on schedule.	SAGO
INCANA	Phase 1	35,000	TBD	Applied		SAGD
	Phase 2	32,500	TBO	Announced		THE REAL PROPERTY.
	Phose 3	32,500	TED	Announced		SAGD
	Phase 1A	10,000	2002	Operating		SAGD
	Phase 1B	8,800	2008	Operating		SAGD
TOTAL MENT	Phose 1C	40.000	2011	Under		SAGD
<b>以他们的关系</b>	Phase 1D	40,000	TBD	construction Approved		SAGD
Christinu Lake	Dham 15		700	15 / 18	EnCana has filed its proposal terms of reference with Alberta Environment	-3261
	Phose 1E	40,000	TBD	Announced	for phases 1E-1G.	SAGC
	Phase 1F	40,000	TBO	Announced		SAGD
HATE PARTY	Phase 1G	40,000	TBD	Anounced		SAGD
	Phase 1A	24,000	2001	Operating		SAGD
	Debottlenecking	6,000	2003	Operating		SAGD
	Phase 1C — Stage 1	10,000	2005	Operating		SAGD
Foster Creek	Phase 1C — Stage 2	20,000	2007	Operating		SAGD
	Phase 1D	30,000	2009	Operating	Commissioning nearing completion. Production remping up.	SAGD
· 科斯斯特里斯	Phase 1E	30,000	2009	Operating	Commissioning nearing completion. Production remping up.	SAGD
The state of the	Phose 1F	30,000	TBO	Application		SAGD



COMPANY	сивлент Рвојест	CAPACITY (hbl/d)	START-	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOG
ENERPLUS RESOURCE	ís .	10.554578	21		<b>经验证的证据</b> (1) 11 12 12 12 12 12 12 12 12 12 12 12 12	
ATT 1 TO THE	Phase 1	10,000	TBO	Application	Enerplus has deferred the Kirby project, but will continue resource	SAGD
Kirby	Phase 2	25,000	TBO	Announced	assessment.	SAGD
E-T ENERGY		25-65 STATE	MOD AT RESIDENT		超过40周分别的图15个名词是被基础是经验的分别自由多数	
Poplar Creek		10,000	2011	Approved	Expanded field test of ET-DSP complete.	ET-USP
EXCELSIOR ENERGY		Baren S		Assets		_1000
langingstone	Phase 1	10,000	2011	Announced	Excelsior says it will test a proprietary process called combustion overhead gravity drainage (COGD) on its leases. Application to be filed in Q2.	COCD
GRIZZLY OIL SANDS				_		
Algar Lake		10,000	TBD	Announced		SAGD
HUSKY ENERGY		THE REAL PROPERTY.	1 800			
McMullen	Pilot	775	TBD	Application		SAGD
	Phase 1	50,000	TBD	Approved	Husky reports the cost estimate for Sunrise's first phase has dropped from an estimated \$4.5 billion to \$2.5 billion, citing other project delays and the global economic slowdown.	SAGD
	Phase 2	50,000	TBD	Approved	good corrolls sollowill	SAGD
Sunrise			3011003		Sunrise is in "optimization" mode, to simplify its scope and take advantage	SAGD
70000000000000000000000000000000000000	Phase 3	50,000	TBO	Approved	in the recent downturn in the demand for goods and services.	-
一个大人从李行马里	Phase 4	50,000	TBO	Approved	CONTRACTOR OF STREET AND STREET A	SAGD
IVANHOE ENERGY	THE CASE OF LAW	E)(\$1.00 La	200 BOS GO		Ivanhoe reports successful processing of Athabasca bitumen at its new	
Tomorock	SAGD with HTL upgrading	20,000	2013	Announced	feedstock test facility in Texas. Regulatory application to be filed in 2010.	SAGD
JAPAN CANADA OIL	SANDS	SEA		1 00.00		100
Hangingstone	Pilot	10,000	2002	Operating		SAGD
是是外方的方面	Phase 1	35,000	TBD	Disclosed	The state of the s	SAGD
KOREA NATIONAL C						
BlockGold	Phase 1	10,000	TBD	Application		SAGD
	Phase 2	20,000	TBD	Announced	STURMENT OF THE PROPERTY OF TH	SAGO
LARICINA ENERGY	CACD-II-A	1,800	2012	Application	Laricina reports the pilot is "development ready."	SAGD
Germain	SAGD pilot Phase 1	10,000	TBO	Announced	Concina reports the process development today.	SAGD
2000 NERSON	Carbonate SAGD	1,800	2011	Approved	ERCB approval in hand. Alberta Environment approval expected shortly.	SAGD
Saleski	demonstration		TBO	Announced		SAGD
MEG ENERGY	Phase 1	10,000	IBU	Announced		
MEG ENERGY	No.	2,000	Service of	Outputing.	Production commenced April 2008.	SAGD
<b>包装加速机</b>	Phase 1	3,000	2008	Operating		SAGD
Chalonial sha	Phase 2	22,000	2009	Approved	Construction nearing completion.	SAGD
Christina Lake	Phase 2B	35,000	TBO	Application		SAGD
	Phose 3A	75,000	TBD	Application		SAGD
STATE STATE	Phase 38	75,000	TBD	Application	and the second s	SAGO
NEXEN	100	101111111111111111111111111111111111111	3050000	4	Nexen says the reservoir is performing well and bitumen production is	
	Phose 1	72,000	2007	Operating	reflecting the amount of steam injected into the reservoir. Modifications have been made to accelerate steam injection capability. Valumes ramping up.	SAGD
Long Lale	Phase 2	72,000	TBO	Announced	Sanctioning deferred until late 2009.	SAGD
	Phase 3	72,000	ТВО	Announced		SAGD
	Phase 4	. 2,000	TBO	Announced		SAGD
		70,000	KNAME STORM			SAGD
Long Lake South	Phase 1	70,000	TBO	Approved		SAGD
N. COLV	Phase 2	70,000	TBD	Approved		37.00
N-SOLV	NOT NOT	2.000	and the same of	(c) (c) (c) (c) (c)	The state of the s	N-SOLV
(国际)	Pilot plant	2,000	2010	Announced	THE RESERVE THE PARTY OF THE PA	
PATCH INTERNATIO	NAL	1005	7-1			SACD
Ells River		10,000	TBO	Announced	The company has indicated it is for sale.	SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	SPARIS	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
PEARL EXPLORATION	0	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	911		- And the state of	1-
Blackrod	Pilot	500	2009	Application		SAGD
PETROBANK ENERGY	AND RESOURCES				and the second of the second	
Whitesands	Pilot	1,900	2006	Operating	Petrobank reports production volumes have reached as high as 404 bbl/d, with produced gas volumes and rates confirming the toe to heel process.	THAI
	Expansion	1,900	2008	Approved		THAI
	Phase 1	10,000	TBD	Applied	Engineering firm Vista Projects has been awarded FEED services to	THAI
May River	Subsequent Phases	90,000	TBD	Disclosed	Petrobank for the wellpad and pipeline package of May River.	1 30 A 20
PETRO-CANADA		STATE OF THE PARTY.	100		BACKET SAN TO THE WEST AND ASSESSED.	7,000
Chard	Phase 1	40,000	TBO	Announced	Petro-Canada and Suncor Energy have agreed to merge, a transaction to be	SAGD
	Phase 1	40,000	TBO	Disclosed	completed in Q3.	SAGD
Lewis	Phase 2	40,000	TBO	Disclosed		SAGD
ACAUTA LA	Phose 1	33,000	2002	Operating		SAGD
MacKay River	Phose 2	40,000	2012	Approved	Sanction on hold until commodity prices and financial markets stabilize, and	SAGD
CANADA CONTRACTOR	Phase 1	40,000	TBO		the proposed merger with Suncor is completed.	
Meadow Creek	Phase 2	40,000	TBD	Approved		SAGD
COLUMN DA CIPIC D		ACAL COMPA		CHARLES	IN MEDICAL CONTROL OF THE SMITH CHARLES	3,00
SOUTHERN PACIFIC R	ESOURCE					
STPMcKay		10,000	TBD	Announced	Southern Pacific is currently having its McKay asset evaluated by McDaniel and Associates.	SAGD
STATOILHYDRO CAN	ADA				THE STATE OF THE S	
Kai Kas Dehseh-Leisme	Demonstration	10,000	2009	Under	Construction over 50 per cent complete.	SAGD
· · · · · · · · · · · · · · · · · · ·	Commercial	20,000	TBD	Construction Applied		SAGD
Leismer	Expansion	20,000	TBD	Applied		SAGD
Corner		40,000	ТВО	Applied		SAGD
Thombury		40,000	TBD	Applied		SAGD
Cornes	Expansion	40,000	TBD	Applied		SAGD
Hangingstone		20,000	TBD	Applied		SAGD
Thombury	Expansion	20,000	TBD	Applied		SAGD
Northwest Leismer		20,000	TBO	Applied		SAGD
South Leismer		20,000	TBD	Applied		SAGD
SUNCOR ENERGY						
	Phase 1	33,000	2004	Operating	Suncor has agreed to merge with Petro-Canada, a transaction to be complete in Q3.	SAGD
	Phase 2	35,000	2006	Operating	compress mage.	SAGD
The state of	Cogeneration and Expansion	25,000	2007	Operating		SAGD
	Phose 3	52,500	TBD	Suspended	Construction being wound down into "safe mode," waiting out economy.	SAGD
Firebog					Construction of the Firebag sulphur plant, originally targeted for completion	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Phase 4	62,500	TBD	Application	in Q2-09 is now scheduled to be finished in Q3-09. Delay is due to delivery schedule of modules from vendors.	SAGD
	Phose 5	62,500	TBD	Application		SAGD
	Phase 6	62,500	TBD	Application		SAGD
200	Stages 3-6 Debottlenecking	23,500	TBD	Application		SAGD
SUNSHINE OIL SANDS				Modest and		W-3416
18 E 143	Phase 1	10,000	TBD	Announced		SAGD
West Ells	Phase 2	30,000	TBD	Announced		SAGD
	Phose 3	25,000	TBD	Announced		SAGD
	Phase 1	10,000	TBD	Announced		SAGD
Thickwood	Phase 2	30,000	TBD	Announced		SAGD
TOTAL FURGANIAN	Phase 3	25,000	TBD	Announced	8-2 DO FEED WAR TO SEE STREET	SAGD
TOTAL E&P CANADA	N .		No.		Production suspended reportedly due to failure to reach target levels. Total	
	Phase 1	2,000	2004	Suspended	will remove the installation. Reserves debooked.	SAGD
Joslyn	Phase 2	10,000	2006	Suspended		SAGD
	Phase 3A	15,000	TBD	Withdrawn		SAGD
	Phase 3B	15,000	TBD	Disclosure		SAGD

COMPANY	CURRENT PROJECT	CAPACITY (bbl/d)	31.1.5 11	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOG
COLD LAKE	REGION - IN SI	TU .		and a section of the second and a section of the second and the se	ang properties and the later the second section of	
BR OIL SANDS (SHEL	ii)	<b>广州</b> 新疆		A Same		To be described in
	Phase 1	10,000	2008	Operating		SAGD
Orion	Phase 2	10,000	TBD	Approved		SAGD
CANADIAN NATURA	AL RESOURCES					
47度数据是参	Wolf Lake	13,000	1985	Operating		CSS
920100100100	Wolf Lake SAGD	5,500	TBD	Application		SAGD
	Primrose South	45,000	1985	Operating		CSS
	Primrose North	30,000	2006	Operating		CSS
	Primrose East (Burnt Lake)	32,000	2009	Operating	After initial steaming in Q1, Canadian Natural identified oil seepage at the surface on one of the new multi-well pads, but believes it has identified the issue and the remedial action required.	CSS
A THE	CSS Follow-up Process	25,000	TBD	Application		css
HUSKY ENERGY		TAL SE				1
Caribou	Demonstration Project	10,000	TBD 11	Approved		SAGD
Tucker	Phase 1	30,000	2006	Operating	Additional drilling will most likely not continue until market conditions improve.	SAGD
IMPERIAL OIL						
	Phases 1-10: Leming, Maskwa, Mahihkan	110,000	1985	Operating		css
	Phases 11-13: Mahkeses	30,000	2003	Operating		CSS
	Phases 14-16: Nabiye, Mahihkan North	30,000	TBD	Approved	Imperial will re-submit its Nabiye project after design modifications to improve environmental performance.	CSS
KOCH EXPLORATION	N CANADA	OF STATES				
Gemini	SAGD Project	10,000	TBD	Application	Permit application filed on June 15, 2009. Koch is performing detailed engineering design work and public consultation is ongoing.	SAGD
OSUM OIL SANDS			1 1 1 1 1 1	10.512		
Taige	SAGD Project	25,000- 35,000	2014	Disclosed	Application anticipated by year-end. FEED is complete and an environmental impact assessment is underway.	SAGD
PENGROWTH ENERG	SAGD Pilot	2,500	TBD	Application	Delineation wells drilled in Q1 reportedly met or exceeded expected bitumen reservoir thickness estimations. Detailed design engineering continues. Team is working with ERCB and Alberta Environment on supplemental information requests.	SAGD
PEACE RIVE	R REGION - IN	SITU			Copperation of the contract of a contract of	
ANDORA ENERGY (F	PAN ORIENT)		THE STATE OF		Sales de la fill de la fille d	0.00
Sown Lake	SAGD Demonstration	1,400	TBD	Application		SAGD
NORTH PEACE ENER	GY					39.
BANG BUST	CSS Pilot	1,001	2008	Operating	First steam achieved.	CSS
Red Earth	Expansion	3,000	TBD	Announced	North Peace is re-assessing its capital budget for the second half of 2009 and exploring various alternatives for obtaining funds to progress future capital requirements.	css
PENN WEST ENERGY	TRUST	ST PATE				
Seal	CSS Pilot	75	TBD	Application		css
SHELL CANADA	2112			100000		
	Cadotte Lake	12,501	1986	Operating		css
Carmon Creek	Phase 1	37,500	TBO	Announced	Shell has re-initiated stakeholder consultation, by way of a public information document. It is preparing an environmental impact assessment for a new application targeted for later this year.	css
	Phase 2	50,000	TBD	Announced	to a new approacher targetes for sater this year.	css
Morros de la companya de la company	CANADA CANADA			Santia and a		
A T H A B A S C A CANADIAN NATURA		RADING				
	Phase 1	135,000	2008	Operating	First production of synthetic crude oil achieved. Construction and commissioning of final unit completed in late March. Canadian Natural expects production volumes to stabilize in Q2, with a steady ramp-up to full production by the end of 2009.	Upgrader
Horizon	Phases 2 and 3	135,000	TBD	Approved		Upgrader
			2007/07/2009 Det	100 St. (200 St.)		20 / 20/20
100年展览日第	Phase 4	145,000	TBD	Announced		Upgrader
	Phase 5	162,000	TBD	Announced		Upgrade

Process   7,2000   70	COMPANY	CURRENT PROJECT	CAPACITY (bb/d)	5000	REGULATORY STATUS	DEVELOPMENT PROGRESS	TECHNOLOGY
Process   72,000   720,00	NEXEN						E
Prices 3 72,000 TEO Ammanded Prices 4 72,000 TEO Ammanded Upgrader Prices 5 72,000 TEO Ammanded Upgrader Upgrader Prices 6 72,000 TEO Ammanded Upgrader Upgrader Prices 6 72,000 TEO Ammanded Upgrader Upgrader Upgrader Vision Collection (Carl Link) Teo Ammanded Upgrader Vision Collection (Carl Link) TeO Ammanded Upgrader Vision Collection (Carl Link) TEO Ammanded Upgrader Vision Carl Link TEO Ammanded Upgrader Vision Collection (Carl Link) TEO O TEO Ammanded Upgrader Vision Carl Link TEO O		Phase 1	72,000	2008	Operating	capacity during ramp-up will be capable of processing all of the forecasted	Upgroder
Price 4 77,000 150 Annumed Upgrader Upgrader Price 5 77,000 150 Annumed Upgrader Upg	是	Phase 2	72,000	TBD	Approved	Sanction deferred until late 2009.	Upgrader
Prizze 4 72,000 TEG. Annuanced Prizze 5 72,000 TEG. Annuanced Upgrader Upgrader Prizze 5 72,000 TEG. Annuanced Upgrader	Long Lake	Phose 3	72,000	TBO	Announced		Upgrader
Place S 72,000 150 Amounted Upgrader  SINCOR INSTANCE  SINCOR INSTANCE  Book Life and Life an				KIND OF THE PARTY			
Photo   Process   Photo   Process				Sales and the sales are			
Bose Lil and Lil Bose							
Maintain Materian Hat   Approved   Complete in Q3.   Complete in	SUNCOR ENERGY	Those o	Nese VIII			ENGLISHED BY THE TOTAL OF THE VERY	2000000
Milennium Coler Unit Place 1 156,000 TBD Approved Phase 2 78,000 TBD Application Sings 2 Expansion 115,000 TBD Application Phase 3 50,000 TBD Application The 6 Crops Lignaries Phase 2 10,000 TBD Application Fine 3 10,000 TBD Application Fine 4 10,000 TBD Application Fine 4 10,000 TBD Application Fine 5 5,400 TBD Application Fine 5 5,400 TBD Application Fine 6 Crops Lignaries Fine 5 5,400 TBD Application Fine 6 Fine 1 10,000 TBD Application Fine 6		Base U1 and U2	281,000	1967	Operating		Upgrader
Phote 1 156,000 TBD Approved Phote 2 78,000 TBD Approved the scoronsy.  Stoges 1 and 2 29,070 976 Operating Stoges 1 and 2 29,070 976 Operating Stoges 2 policities and 15 Stoges 2 policities (Stoges 2 policities) 115,000 2006; Operating Stoges 2 policities (Stoges 2 policities) 115,000 2006; Operating Stoges 2 policities (Stoges 2 policities) 115,000 2006; Operating Stoges 2 policities (Stoges 2 policities) 115,000 1100 Amenosed Policities (Stoges 2 policities) 115,000 1100 Amenosed Stoges 2 policities (Stoges 2 policities) 115,000 115,000 115,000 115,000 115,000 115,000 115,000 115,000 115,000 115,000 115,000 115,000 115,000 115,		Milliennium Vocuum Unit	43,000	2005	Operating		Upgrader
Place 2 78,000 Tip Approved:  Stope 1 Exposion 116,000 Tip Approved:  Stope 2 Exponsion 116,000 Stope 3 Exposion 118,000 Stope 3 Exposion 118,000 Stope 4 Exposion 118,000		Millennium Coker Unit	116,000	2008	Operating		Upgrader
SYNCRUDI  Stages 1 and 2 290.700 1978 Operating Stages 2 Sponsion 163.000 Stage 3 Sponsion 163.000 Stage 4 Sponsion 179.000 179.		Phase 1	156,000	TBO	Approved		Upgrader
Stages 1 Exponsion Stages 2 Exponsion 16,300 Stages 2 Exponsion 16,300 Stages 3 Exponsion 18,300 Stages 4 Exponsion 18,300	Voyageur	Phase 2	78,000	ТВО	Approved)	ore according.	Upgrader
Stoge 3 Expossion   116,300   2006   Operating   Operating   Operating   Stoge 3 Debotterenck   46,500   TBD   Amounted   Stoge 4 Expossion   139,500   TBD   Amounted   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.   Operating stageted mointenance program under its moster services operanem with Improid Exoon Mobil.	SYNCRUDE		NAME OF TAXABLE PARTY.	1 5 -52		CONTROL OF THE WAY THE PARTY OF	we will
Stogs 3 Expansion   116,300   2006   Operating   Stogs 3 Debottleneck   46,500   100   Ammounced   Stogs 4 Expansion   139,500   1700   Ammounced   Stogs 4 Expansion   199,000   1700   Ampelled   Stogs 4 Expansion   199,000   1700   Ampelled   199,000   1700   1700   Ampelled   199,000   1700   Ampelled   199,000   1700	THE REPORT OF	Stages 1 and 2	290,700	1978	Operating	Syncrude has been constrained in the supply of bitumen feed to the	Upgroder
Stoge 3 Debottlereck 46,500 SD Amounted Stope Academy Stop		Stage 3 Expansion	116,300	2006	Operating		Upgroder
VALUE CREATION  Filot 1,000 TBD Application Phose 1 2,000 TBD Amounced  IN O U STRIAL HEARTLAND RECION — UP G RADING AND REFINING  ANNOHOLOGY OF Phose 2 10,000 TBD Application Expansion 90,000 2010 Under the construction Phose 3 100,000 TBD Application Phose 3 100,000 TBD Application Phose 4 100,000 TBD Application Phose 3 100,000 TBD Application Phose 4 100,000 TBD Application Phose 5 54,400 TBD Application Phose 2 54,400 TBD Approved Phose 3 54,400 TBD Approved Phose 2 50,000 TBD Approved Phose 3 50,000 TBD Approved Phose 3 50,000 TBD Approved Phose 3 54,400 TBD Approved Phose 4 TBD Approved Phose 5 50,000 TBD Approved Phose 5 50,000 TBD Approved Phose 6 TBD Approved Phose 7 TBD Approved Phose 7 TBD Approved Phose 7 TBD Approved Phose 9 TBD Appro	Mildred Loke	Stage 3 Debottleneck	46,500	180	Announced		Upgrader
Pilot   1,000   TBD   Application   Pilot   1,000   TBD   Application   Pilot   Amounced   Pilot   P		Stage 4 Expansion	139,500	TBD :	Announced	agreement with Imprial/Exxon Mobil.	Upgrader
Phose 1   2,000   TID   Announced   Upgrader   Upgrad	VALUE CREATION						200000
Phase 2 10.000 TBD Announced Upgrader  INDUSTRIAL HEARTLAND RECION - UPGRADING AND REFINING  ATHARASCAOIL SANDS PROJECT    155,000 2003   Operating Construction   Expansion   90,000 2010   Operating Construction Phase 1   100,000 TBD Application   Upgrader   Upgra				Part of the later			
INDUSTRIAL HEARTLAND REGION - UPGRADING AND REFINEMS  Sociated Upgrader 1   Expansion   90,000   2003   Operating Expansion   90,000   TBD   Application   Operating Upgrader 2   Operating Upgrader 3   Opera	lerre de Grace Upgrade			POST STREET, S			
ATHABASCA OIL SANDS PROJECT  Scotlord Upgrader 1  Scotlord Upgrader 2  Phase 1  Phase 2  Phase 3  100,000  TBD  Application Phase 4  100,000  TBD  Application Phase 4  Phase 1  Phase 1  S4,400  TBD  Approved Phase 2  S4,400  TBD  Approved Phase 3  S4,400  TBD  Approved  TBD  Approved Phase 3  SHe preparation complete. Focus is on commercial agreements.  Upgrader U			-	Total Control		na arrinine	1.0
Scotland Upgrader     Expansion   90,000   2010   Under construction	INDUSTRIAL	HEARTLAND R	EGION .	- UPG	CADING A	ND REFINING	
Scotland Upgrader 1 Expansion 90,000 2010 Construction to the combined mine and upgrader sites.  Phase 1 100,000 TBD Applied 1 Phase 2 100,000 TBD Applied 100,000 TBD Approved 100,000 TBD App	ATHABASCA OIL SAN	DS PROJECT	問題的	and a	, Market	SELECTION OF STREET, S	
Scotford Upgrader   Phase 1   100,000   TBD   Application   Phase 3   100,000   TBD   Application   Phase 4   100,000   TBD   Application   Phase 4   100,000   TBD   Application   Phase 4   100,000   TBD   Application   Phase 5   100,000   TBD   Application   Phase 6   100,000   TBD   Application   Phase 7   S4,400   TBD   Approved   Phase 9   S4,400   TBD   Approved   S4,400   TBD   Approved   Phase 9   S4,400   TBD   Approved   S4,400   TBD   Approved   Phase 9   S4,400   TBD   Approved   Phase 9   S4,400   TBD   Approved   S4,400   TBD   Approved   S4,400   TBD   Approved   Phase 9   S4,400   TBD   Approved   Phase 1   S5,000   TBD   Approved   Phase 1   S5,000   TBD   Approved   Phase 1   S6,000   TBD   Withdrawn   Upgrader   Phase 1   S6,600   TBD   Withdrawn   Upgrader   Upgrader   Upgrader   Phase 2   S6,600   TBD   Withdrawn   Upgrader   Upgrader   Upgrader   Phase 2   S6,600   TBD   Withdrawn   Upgrader   Upgrader   Upgrader   Phase 2   S6,600   TBD   Application   Upgrader   Upgrader   Upgrader   Upgrader   Phase 2   S6,600   TBD   Application   Upgrader	Scotford Upgrader 1		155,000	3003			Upgrader
Scotford Upgrader 2 Phase 2 100,000 TBD Application Phase 4 100,000 TBD Application Phase 5 S4,400 TBD Approved Phase 2 S4,400 TBD Approved Phase 3 S4,400 TBD Approved Phase 3 S4,400 TBD Approved Phase 1 S0,000 TBD Approved Phase 3 S0,000 TBD Approved Phase 2 S0,000 TBD Approved Phase 3 S0,000 TBD Approved Phase 5 STATIONARY Phase 1 S0,000 TBD Approved Construction decision on Fort Hills upgrader has been deferred. Upgrader Struthcona Reflacery Conversion TBD Approved Construction complete. Ramp-up continues. Upgrader Statiolity drougnader Phase 2 T5,000 TBD Withdrawn Phase 2 T5,000 TBD Withdrawn Phase 2 S6,600 TBD Withdrawn Upgrader Upgrader Phase 2 S6,600 TBD Withdrawn Upgrader Upgrader Phase 2 S6,600 TBD Withdrawn Upgrader Phase 2 S6,600		Expansion	90,000	2010		the combined mine and upgrader sites.	Upgrader
Phase 3 100,000 TBD Application Phase 4 100,000 TBD Application Phase 4 100,000 TBD Application Phase 4 100,000 TBD Application Phase 1 54,400 TBD Approved Phase 2 54,400 TBD Approved Phase 3 54,000 TBD Approved Phase 3 54,000 TBD Approved Phase 3 54,000 TBD Approved Phase 1 50,000 TBD Approved Upgrader Phase 2 50,000 TBD Approved Phase 3 50,000 TBD Approved Phase 1 165,000 TBD Approved Phase 1 165,000 TBD Approved Struthcona Refinery, Comersion TSTATOILHYDRO CANADA  TSTATOILHYDRO CANADA TBD Withdrawn TOTAL EEP CANADA Northern Lights Phase 1 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 3 TBD Withdrawn Phase 3 TBD Withdrawn Phase 3 TBD Withdrawn		Phase 1	100,000	TBD	Applied		Upgroder
BA ENERGY  Phase 1 54,400 TBD Approved Phase 2 54,400 TBD Approved Phase 2 54,400 TBD Approved Phase 3 54,400 TBD Approved  Phase 1 50,000 TBD Approved Upgrader  Phase 1 50,000 TBD Approved Phase 2 50,000 TBD Approved Phase 2 50,000 TBD Approved Phase 3 50,000 TBD Approved Phase 1 165,000 TBD Approved Phase 1 165,000 TBD Approved Phase 1 165,000 TBD Approved Struthcora Refinery Conversion  Struthcora Refinery Conversion  Phase 1 75,000 TBD Withdrawn Phase 2 756,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 1 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 3 TOTAL E&P CANADA  Northern Lights Phase 1 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 3 TOTAL E&P CANADA  Northern Lights Phase 1 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Phase 3 TOTAL E&P CANADA  Northern Lights Phase 2 95,000 TBD Application Phase 2 95,000 TBD Application Phase 3 TDTAL E&P CANADA	Scotford Upgrader 2	Phose 2	100,000	TBD	Application		Upgrader
Phase 1 54,400 TBD Approved Sort Will be up to four years before it will revisit the project. BA Energy has been granted court protection from its creditors.  Phase 2 54,400 TBD Approved Deen granted court protection from its creditors.  Phase 3 54,400 TBD Approved Upgrader Upgrader Deen granted court protection from its creditors.  Phase 1 50,000 TBD Approved Upgrader Upgrader Dense 3 50,000 TBD Approved Dense 3 50,000 TBD Approved Dense 3 50,000 TBD Approved Upgrader Upgrader Upgrader Upgrader Dense 3 50,000 TBD Approved Dense 3 50,000 TBD Approved Upgrader Upgrader Upgrader Dense 3 50,000 TBD Approved Upgrader Upgrader Dense 3 50,000 TBD Approved Upgrader Upgrader Dense 3 50,000 TBD Approved Upgrader Dense 3 50,000 TBD Withdrawn Upgrader Dense 5 50,000 TBD Withdrawn Upgrader Dense 5 50,000 TBD Withdrawn Upgrader Dense 5 50,000				ACCUSED TO STATE OF THE PARTY.			
Phase 1 54,400 TBD Approved Sonstruction from its creditors.  Phase 2 54,400 TBD Approved Sons it will be up to four years before it will revisit the project. BA Energy has been granted court protection from its creditors.  Upgrader  Phase 3 54,400 TBD Approved Phase 3 50,000 TBD Approved  Phase 1 50,000 TBD Approved Phase 2 50,000 TBD Approved Phase 3 50,000 TBD Approved Phase 1 165,000 TBD Approved Phase 1 165,000 TBD Approved Struthcone Refinery Conversion  Struthcone Refinery Conversion  Phase 1 75,000 TBD Approved Struthcone Refinery Conversion  Phase 1 75,000 TBD Withdrawn  Phase 2 175,000 TBD Withdrawn  Phase 2 56,600 TBD Withdrawn  Northern Lights Upgrader  Phase 2 56,600 TBD Withdrawn  Phase 3 TOTAL E&P CANADA  Northern Lights Upgrader  Phase 2 56,600 TBD Withdrawn  Phase 3 TBD Withdrawn  Phase 4 TBD Withdrawn  Phase 5 TBD Withdrawn  Phase 6 TBD Withdrawn  Phase 7 TBD Withdrawn  Phase 9 TBD Withdrawn  Phase 1 TBD Withdrawn  Phase 1 TBD Withdrawn  Phase 2 TBD Withdrawn  Phase 3 TBD Withdrawn  Phase 4 TBD Withdrawn  Phase 5 TBD Withdrawn  Phase 6 TBD Withdrawn  Phase 7 TBD Withdrawn  Phase 9 TBD Withdrawn  Phase 9 TBD Withdrawn  Phase 1 TBD Withdrawn  Phase 9 TBD Withdrawn  Phase 1 TBD Withdrawn  Phase 9 TBD Withdrawn  Phase 1 TBD Withdrawn  Phase 1 TBD Withdrawn  Phase 2 TBD Withdrawn  Phase 3 TBD Withdrawn  Phase 4 TBD Withdrawn  Phase 5 TBD Withdrawn  Phase 6 TBD Withdrawn  Phase 7 TBD Withdrawn	PA FNEDCY	Phase 4	100,000	TBD	Application	SHORN OF STREET, WITH STREET, WHITE SERVICES	
Deep granted court protection from its creditors.   Deep granted court protection from its creditors.	BA ENERGY	Phose 1	54.400	TRO	Annowed		Úparader
Phase 2 54,400 TBD Approved Phase 3 54,400 TBD Approved  Phase 1 50,000 TBD Approved Phase 2 50,000 TBD Approved Phase 2 50,000 TBD Approved Phase 3 50,000 TBD Approved Phase 1 165,000 TBD Approved Phase 1 165,000 TBD Approved Phase 1 165,000 TBD Approved Phase 2 175,000 TBD Approved Strathcona Refinery Conversion  Strathcona Refinery Conversion  StatoliHydro Upgrader Phase 1 75,000 TBD Withdrawn Phase 2 175,000 TBD Withdrawn Phase 2 56,600 TBD Withdrawn Upgrader Phase 1 56,600 TBD Withdrawn Phase 2 56,600	Heartland Upgrader	Those I	34,400				
NORTH WEST UPGRADING  Phase 1 50,000 TBD Approved  Phase 2 50,000 TBD Approved  Phase 3 50,000 TBD Approved  Phase 3 50,000 TBD Approved  Phase 3 50,000 TBD Approved  Phase 1 165,000 TBD Approved  Phase 1 165,000 TBD Approved  Phase 2 and 3 175,000 TBD Approved  Strathcona Refinery Conversion  Strathcona Refinery Conversion  StatoilHydro Upgrader  Phase 1 75,000 TBD Withdrawn Phase 2 175,000 TBD Withdrawn Phase 2 175,000 TBD Withdrawn Phase 2 175,000 TBD Withdrawn Upgrader  TOTAL EXP CANADA  Northern Lights Upgrader  Phase 1 56,600 TBD Withdrawn Phase 2 56,600		Phase 2	54,400	TBD	Approved		Upgrader
Phase 1 50,000 TBD Approved Site preparation complete. Focus is on commercial agreements.  Upgrader Phase 2 50,000 TBD Approved Upgrader Upgrader  PETRO-CANADA  Phase 1 165,000 TBD Approved Upgrader  Phase 2 175,000 TBD Approved Construction decision on Fort Hills upgrader has been deferred.  Phase 2 and 3 175,000 TBD Approved Construction decision on Fort Hills upgrader has been deferred.  Petro-Canada has agreed to merge with Suncor, a transaction to be complete in Q3.  Strathcona Refinery Conversion  Strathcona Refinery Conversion  StrathChydro Upgrader  Phase 1 75,000 TBD Withdrawn  StatoilHydro Upgrader  TOTAL ESP CANADA  Northern Lights Phase 2 56,600 TBD Withdrawn  Upgrader  Phase 2 56,600 TBD Withdrawn  Upgrader  Phase 2 56,600 TBD Application  TBD Application  Upgrader	S confice to the	Phase 3	54,400	TBD	Approved		Upgrader
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## Glossary of oil sands terms

#### API

An American Petroleum Institute measure of liquid gravity. Water is 10 degrees API, and a typical light crude is from 35 to 40. Bitumen is 7.5 to 8.5.

#### Barrel

The traditional measurement for crude oil volumes. One barrel equals 42 US gallons (159 litres). There are 6.29 barrels in one cubic metre of oil.

#### Bitumen

Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oilsand, but saturation varies.

#### Condensate

Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid, and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

#### Cyclic steam stimulation

For several weeks, high-pressure steam is injected into the formation to soften the oilsand before being pumped to the surface for separation. The pressure created in the underground environment causes formation cracks that help move the bitumen to producing wells. After a portion of the reservoir has been saturated, the steam is turned off and the reservoir is allowed to soak for several weeks. Then the production phase brings the bitumen to the surface.

#### Density

The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m³) or degrees on the American Petroleum Institute (API) gravity scale; in western Canada, oil up to 900 kg/m³ is considered light to medium crude—oil above this density is deemed as heavy oil or bitumen.

#### Diluent

see Condensate

#### Established recoverable reserve

Reserves recoverable under current technology and present and anticipated economic conditions, plus that portion of recoverable reserves that is interpreted to exist, based on geological, geophysical, or similar information, with reasonable certainty.

#### Established reserves

Reserves recoverable with current technology and present and anticipated economic conditions specifically proved by drilling, testing, or production, plus the portion of contiguous recoverable reserves that are interpreted to exist from geological, geophysical, or similar information with reasonable certainty.

#### Extraction

A process, unique to the oil sands industry, which separates the bitumen from the oilsand using hot water, steam, and caustic soda.

#### Froth treatment

The means to recover bitumen from the mixture of water, bitumen, and solids "froth" produced in hot water extraction (in mining-based recovery).

#### Gasification

A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy byproducts.

#### Greenhouse gases

Gases commonly believed to be connected to climate change and global warming. CO<sub>2</sub> is the most common, but greenhouse gases also include other light hydrocarbons (such as methane) and nitrous oxide.

#### Initial established reserves

Established reserves prior to the deduction of any production.

#### initial volume in place

The volume calculated or interpreted to exist in a reservoir before any volume has been produced.

#### in situ

Latin for "in place." In situ recovery refers to various methods used to recover deeply buried bitumen deposits.

#### In situ combustion

A displacement enhanced oil recovery method. It works by generating combustion gases (primarily CO and CO<sub>2</sub>) downhole, which then "pushes" the oil towards the recovery well.

#### Lease

A legal document from the province of Alberta giving an operator the right to extract bitumen from the oilsand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.



#### iviuskea

A water-spaked layer of decaying plant material, one to three, metres thick, found on top of the averburden.

#### Oil Sands

Bitumen-soaked sand, located in four geographic regions of Alberta; Athabasca, Wabasca, Cold Lake, and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total deposits of bitumen in Alberta are estimated at 1.7 to 2.5 trillion barrels.

#### Overburden

A layer of sand, gravel, and shale between the surface and the underlying oilsand. Must be removed before oil sands can be mined. Overburden underlies muskeg in many places.

#### Pilotofent

Small model plant for testing processes under a tual production conditions

#### Proven recoverable reserve

Reserves that have been proven through production or testing to be recoverable with existing technology and under present economic conditions.

#### Reclamation

Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

#### Remaining established reserves Initial reserves less cumulative production.

#### Royalty

The Crown's share of production or revenue. About three quarters of Canadian crude oil is produced from lands, including the oil sands, on which the Crown holds mineral rights. The lease or permit between the developer and the Crown sets out the arrangements for sharing the risks and rewards.

## Steam assisted gravity drainage (SAGD)

An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

#### Synthetic crude oil

A manufactured crude oil comprised of naptha, distillate, and gas oil-boiling range material. Can range from high-quality, light sweet bottomless crude to heavy, sour blends.

#### ailings

and fine clay particles that is a byproduct of removing the bitument from the oils and.

#### Tailings settling basin

The primary purpose of the tailings settling basin is to serve as a process vessel allowing time for tailings water to clarify and silt and clay particles to settle, so the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

#### Thermal recovery

Any process by which heat energy is used to reduce the viscosity of bitumen in situ to facilitate recovery.

#### Toe-to-heel air injection (THAI)

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#### Truck-and-shovel mining

Large electric or hydraulic shovels are used to remove the oilsand and load very large trucks. The trucks haul the oilsand to dump pockets where it is conveyed or pipelined to the extraction plant. Trucks and shovels are more economic to operate than the bucket-wheel reclaimers and draglines they have replaced at oil sands mines.

#### Upgrading

The project of converting heavy oil or bitumen into synthetic crude active through the removal of carbon (coking) or the addition by hydrogen (hydroconversion).

#### Vapour extraction (VAPES)

VAPEX is a non-thermal lecovery method that involves injecting a gaseous hydrocarbon solvent into the reservoir where it dissolves into the sludge-like oil, which becomes less viscous (or more fluid) before draining into a lower horizontal well and being extracted.

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## CONTACTS

## Oil Sands Producers

Alberta Glinnels

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### Associations/Organizations

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